

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to a Method of Manufacturing Tiles Surfaced with a Granular Material

We, WILSON'S CAVICRETE LIMITED, a British Company, of 190 St. Vincent Street, Glasgow, C.2, Great Britain, do hereby declare the invention, for which we pray that

5 a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a method of manufacturing tiles surfaced with a granular material.

The present invention is a method of manufacturing tiles surfaced with a granular material, the method comprising applying a lubricant to a support plate, applying a wet mix of cement to the appropriate desired tile thickness over the lubricant, and depositing granular material unevenly on to the upper surface of the cement to provide an irregular surfacing.

20 Preferably, the method includes the step of subdividing the tile by one or more lines of weakening while still soft or plastic thereby to enable ready and convenient breakage of same into smaller sized tiles as required or desired.

Preferably also, the support plate has a flat upper surface.

30 An example of a lubricant suitable for use in the method according to the present invention is a soluble oil sold under the trade name Shell Oil R 775.

35 The term "granular material" used herein and in the claims is to be construed as natural stone or rock such, for example, as sandstone, limestone or other freestone, or pegmatite, aplite or other granite, or portland stone, whinstone, marble, or other stone or rock crushed to a granular, comminuted or other powdery consistency, or sand or other mineral material occurring naturally in dis-

crete particles, or synthetic resin granules.

The method may include the step of applying to the gate to cover same a strip of rubber or other elastomeric material (hereinafter and in the claims referred to simply as "rubber") of the same shape and area as the plate, the steps of applying the lubricant and subsequently the wet cement mix being then effected on the rubber strip. The rubber strip may absorb a percentage of the lubricant and at times may hold enough lubricant to render redundant separate application of the lubricant.

45 The rubber strip may have a plurality of recesses spaced more or less uniformly over the area of its upper surface and increasing substantially uniformly in cross-section from the face of the strip downwardly, the tile as a result having on its surface a plurality of studs of increasing cross-section in the outward direction.

50 The rubber strip may have an uneven undersurface and this may facilitate stripping of the plate therefrom, for example said undersurface may be fluted or pebbled.

55 In subdividing the tiles by lines of weakening use may be made of metal blades held together in parallel spaced relationship by cross members to form a grating, the blades being pressed into the upper surfaces of the tiles and stop means preferably being provided to prevent full penetration of the tiles. A sheet of cloth for example, is preferably placed between the surface of the tile and the blades prior to pressing of the blades into the tile in order that the grooves formed in the tile are of V-formation, i.e. the walls defining the grooves are bevelled away from one another.

60 The tiles may be permitted to harden naturally, but are preferably subjected to steam treatment both to speed up the harden-

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ing and to effect spontaneous release from the plates. Loose granular material is then removed, for example by brushing or blowing. When the tiles have hardened the plates are
 5 stripped therefrom, and, where use is made of rubber strips, these are keyed into the undercut formed at the inner edge of the deepened surround and those formed about the studs but their inherent flexibility permits
 10 ready stripping thereof from the tiles.

Suitable dyes may be incorporated in the granular material or in the cement or in both said materials, to give various colour effects.

The throwing of the granular material on to the surface of the cement is preferably effected in two stages, wet granular material being thrown on initially to form various and varied irregularities in the surface of the tile, and dry granular material being then thrown
 15 on to draw moisture from the cement and stiffen the latter, especially at the surface thereof. This results in the formation of a surface which is irregular. Instead of using wet granular material initially, dry and cleaned granular material may be employed
 20 and the material is dabbed with a tool, for example a brush, to increase the irregularities in the tile surface.

The manufacture and fitment into position of the usual glazed tiles both require a high degree of precision, any slight deviation in thickness from tile to tile in a set to be fitted being impermissible as is likewise any deviation from straight geometrically precise
 25 lines when fitted.

When tiles made by the method of the present invention on the other hand irregularities from tile to tile are a feature and not a drawback. The tiles can be very thin
 30 and as such can be readily subdivided along the lines of weakening to regular or irregular shapes and the subdivided parts can be further subdivided crosswise without difficulty. Once in a position on a wall surface, however, the tiles are very strong indeed and
 35 not subject to cracking in the same way as glazed tiles.

Mortar is used in application of the tiles to external wall surfaces but any of the usual tile-fixing materials could be used for inside
 40 work.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, in
 45 which:—

Fig. 1 is a top perspective view of part of a tile in accordance with the invention;

Fig. 2 is a top perspective view of the complete tile before removal from the mould
 50 plate;

Fig. 3 is a vertical section through the tile during manufacture thereof and illustrating the formation of lines of weakening therein;

Fig. 4 is also a vertical section through
 55 part of the tile during manufacture thereof,

but to a larger scale than Fig. 3 in order better to enable diagrammatic illustration of steps in the process of manufacture.

Referring to the drawing, the tile 10 is rectangular and is manufactured in the following stages:—

1. A wet mix of cement is prepared.

2. An open-sided mould in the form of a flat plate 11 of sheet steel or other sheet material of sufficient rigidity is laid horizontal, preferably on a prepared horizontal
 75 bed from which it can easily be lifted.

3. A sheet 12 of rubber of the same dimensions as the plate 11 is laid over the plate to coincide therewith. The sheet 12 preferably has an uneven undersurface 13, for example the undersurface may be fluted or pebbled. The sheet 12 has a plurality of recesses 14 spaced more or less uniformly over the area of its upper surface 15. The recesses increase substantially uniformly in cross-section from the face of the strip downwardly, i.e. are of truncated conical or pyramidal shape.

4. A film of lubricating oil, for example that sold under the trade name Shell Oil R 775, is applied over the upper surface of the sheet 12.

5. A layer 16 of the wet mix of the cement is applied over the entire surface area sheet 12. The layer 16 may be of a thickness or depth varying from $\frac{1}{4}$ " to 1" in depth throughout its area. The edges 17 of the layer 16 are bevelled in the inward direction by the use of a trowel.

6. Wet granular material 18 is thrown on to the layer 16. This operation is substantially haphazard and it is not even necessary fully to cover the layer 16. The wet granular material naturally coagulates in lumps of different sizes and weights and indents the surface of the layer 16 to differing degrees depending on the weights and sizes of the lumps and the force and angle of impact thereof with the surface of the layer 16. The result is an irregular surface which manifestly will vary from tile to tile, i.e. is non-repetitive.

6. Alternatively dry and cleaned granular material is thrown haphazardly on to the layer and it is then dabbed by means of a tool, for example a brush, to form a non-repetitive irregular tile surface.

7. The tile is indented from its upper surface to provide lines of weakening at spaced intervals. A convenient size of tile 10 for such indentation measures 22" x 34" and the lines of weakening would be provided parallel to the 22" sides at spaced intervals of 10", 8", 6", 4", 3" and 2" from one said side to the other thus leaving a 1" strip adjacent said other side. The lines of weakening are grooves 20 which do not fully penetrate the tile so that the tile remains an integral whole from which parts can
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 125
 130

readily be broken off by placing the tile over a straight edge and applying pressure. It is desirable that the edges 21 of the grooves 20 should be bevelled away from one another and this effect is obtained very simply by laying a piece of cloth or the like 22 over the top of the tile before forming the groove by indenting the tile with straight-edged blades, for example. A suitable device for forming all of the groove 20 simultaneously is indicated in Fig. 3 wherein a plurality of straight-edged blades 23 are secured together in parallel spaced relationship by transverse bars 24.

8. Dry granular material 19 is then thrown over the surface of the wet (or dry) granular material 18 and any uncovered areas of the layer 16 and the whole exposed surface is covered by the dry granular material 19. The dry material 19 draws moisture from the wet material 18 and cement 16 and stiffens the applied materials, especially at the surface thereof.

9. The tile is hardened. This may be permitted to happen naturally but is preferably speeded up by the use of steam. For this purpose a plurality of tiles while still soft and carried on the plates 11 are arranged in spaced-apart relationship in tiers in a suitable chamber and steam is introduced at a low level in the chamber simultaneously from opposed directions in the form of jets which meet and cause dispersion of the steam throughout the chamber.

10. After hardening of the tile, it is lifted with its rubber sheet backing from the plate and the rubber sheet is stripped therefrom.

11. Loose granular material is removed from the surface of the tile by any convenient means, such as by brushing or blowing.

The subdivided parts can then be subdivided transverse to their lengths across a straight edge without difficulty but lines of weakening in this direction could also be provided for in moulding the tile if desired. A typical mean thickness of the tiles is $\frac{1}{2}$ " with the studs on the under-face $\frac{1}{8}$ " thick or thereabouts.

The studs may be spaced, for example, at $1\frac{1}{2}$ " centres or thereabout and have a maximum diameter of the order of $\frac{3}{8}$ ".

The application of the tiles to wall surfaces is not necessarily work for an expert as slight irregularities in the fixing thereof tend to enhance rather than detract from the final appearance of a wall surfaced with tiles made by the method according to the present invention. When the tile edges are bevelled as shown in the drawing, adjacent tiles may be butted together on fixture to the wall surface and the consequent grooves formed by each pair of adjoining bevelled edges subsequent filled by mortar in the manner of pointing. When the tilt edges are squared strips of wood could be used to interspace adjacent

tiles on fixture to a wall surface and the inter-tile spaces then pointed. When the tiles have studs on their underfaces the mortar or other fixing material is positively keyed thereto, the stud peripheral surfaces forming acute angles with the outer surfaces thereof as the horizontal sections of the studs diminish from said outside surfaces inwardly, and the mortar or other fixing material enters the undercuts so formed.

If there is a change of direction greater than 180° in the application of the tiles to a wall surface to be covered, for example at a corner, tiles are applied with their inner side edges substantially abutting at the angle and the gap between their sideface surfaces is pointed with a wet mix of cement and the same granular material is then applied to the cement, the whole being finished off, for example, with a trowel or the like whereby in effect the two abutting tiles are made unitary.

Tiles made in accordance with the invention could be of any desired shape as the plates 11 are, in effect, moulds with open sides thus obviating any difficulties as regards shape which arise with the use of the usual form of mould.

Conveniently the plates 11 are of sheet steel but manifestly could be of any other suitable material.

Tiles according to the invention need not have studs or other keying features on their rear faces although these are desirable for practical purposes, especially when the tiles are to be applied to vertical surfaces. If the tiles are to be formed without studs or other keying features on their rear faces the upper surface of the sheet 12 of rubber is plain, or alternatively the sheet 2 is omitted and the film of lubricating oil is applied directly to the upper surface of the plate 11.

The tiles need not have lines of weakening, especially where a pattern is desired for a particular surface to be tiled. For example a set of tiles for a pattern may comprise four related sizes of tile such as $9" \times 9"$, $9" \times 4\frac{1}{2}"$, $13\frac{1}{2}" \times 4\frac{1}{2}"$, and $4\frac{1}{2}" \times 4\frac{1}{2}"$. Tiles of the latter sizes may have deepened surrounds with undercut edges at the peripheries of their rear surfaces.

Tiles with holes may readily be produced, all that is required being a blade bent into closed formation to the desired shape and size of the hole and pressed into the tile, while still soft from the upper surface thereof to make contact with the plate 11, or with the rubber sheet 12 when this is used, the material separated off by the blade being removed while the blade is in position.

Tiles made in accordance with the invention are extremely light and this facilitates adherence thereof to vertical walls as they have little tendency to slide downwards. The

front surface of the tiles may be washed with dilute acid.

Tiles according to the invention could be cast on curved plates for application to curved surfaces such as pillars. They can be 5
sawn easily or chopped like slates and they are pointed in the same way as natural stones. The method of manufacture ensures that no two tile surfaces are alike. No difficulties 10
arise as regards size when a surface is to be covered by tiles according to the invention, and thus no pre-planning in drawing offices, etc., is required.

The tiles may be formed with lines of weakening which do not follow any regular 15
pattern so that the tiles when subdivided have irregular and varied shapes so that a wall can be tiled in a random rubble or square and sneck pattern.

Reference is made to our co-pending Patent 20
Application No. 12863—5/62 (Serial No. 911,226) which discloses a tile produced in accordance with the invention, the subject of the present application.

WHAT WE CLAIM IS:—

1. A method of manufacturing tiles surfaces with a granular material, the method 25
comprising applying a lubricant to a support plate, applying a wet mix of cement to the approximate desired tile thickness over the 30
lubricant, and depositing granular material unevenly on to the upper surface of the cement to provide an irregular surfacing.

2. A method as claimed in Claim 1, where- 35
in there is applied to the plate to cover same a strip of rubber or other elastomeric material of the same shape and area as the plate, the steps of applying the lubricant and subsequently the wet cement mix being then 40
effected on the rubber strip.

3. A method as claimed in Claim 2, where- 45
in the rubber strip is formed with a plurality of recesses spaced more or less uniformly over the area of its upper surface and increasing substantially uniformly in cross-section from the face of the strip downwardly, the tile as a result having on its underface a

plurality of studs of increasing cross-section in the outward direction.

4. A method as claimed in Claim 2 or 3, 50
wherein the rubber strip has an uneven undersurface and this may facilitate stripping of the plate therefrom, for example said undersurface may be fluted or pebbled.

5. A method as claimed in any of Claims 55
1 to 4, wherein lines of weakening are formed in the upper surface of the tile.

6. A method as claimed in Claim 5, where- 60
in the lines of weakening are formed by pressing metal blades held together in spaced and parallel relationship by cross members to form a grating into the upper surface of the tile.

7. A method as claimed in Claim 6, where- 65
in stop means is provided on the grating to prevent full penetration of the tile by the blades.

8. A method as claimed in any of Claims 1 70
to 7, comprising subjecting the tile to steam treatment to speed up hardening thereof.

9. A method as claimed in any of Claims 1 to 8, comprising removing non-adhering 75
granular material from the surface of the tile when hardened.

10. A method as claimed in any of Claims 75
1 to 9, comprising incorporating a dye in the granular material.

11. A method as claimed in any of Claims 1 to 10, comprising incorporating a dye in 80
the cement.

12. A method of manufacturing tiles surfaced with a granular material, substantially 85
as hereinbefore described with reference to the accompanying drawing.

13. A tile surfaced with a granular material 85
when produced in accordance with the method as claimed in any one of Claims 1 to 12.

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COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

